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PHYSICO-CHEMICAL PARAMETERS ASSESMENT OF GROUND WATER IN URBAN AREA OF KHAMMAM, TELANGANA

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ABSTRACT

The present study was conducted in urban area of Khammam region for the investigation and assessment of physico –chemical analysis of ground water. The samples are collected in day time from different cites of urban area of Khammam (VDO's colony, Khasba bazaar, Cheruv bazaar, Rotary nagar, Mustafa nagar, Srinivas Nagar, SBIT, Nijampet , Khanapuram, Ballepalli) Table 3 and Fig1.Physico –chemical analysis different parameters were analyzed like P^H, Turbidity(NTU), Electrical Conductivity(micro mhos), Total dissolved Solids (mg/l) Chloride(mg/l), Sulphate (mg/l), Nitrate(mg/l), Total Alkalinity(mg/l), Total Hardness(mg/l), Calcium(mg/l), Fluoride(mg/l), Iron(mg/l).Each parameter was compared with the standard desirable limits of different agencies like BSI, WHO standards, Hence it was reported that PH, Sulphates, Total hardness, Fluoride levels are within the limits of BSI(Bureau of Indian standards), WHO(World Health Organization) and remaining parameters shows variations in different study places.

Key words: Physico –Chemical Analysis, Ground Water, P^H, Turbidity, Nizampet, Khammam

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1. INTURDUCTION

Water is a most important renewable natural resource which plays an important role in the survival of living organisms [1]. Water is one of the most abundantly available substances in nature, covering more than 70% of the earth's surface. Water of the good quality is required for living organisms. At the same time growing populations, progressive industrialization and intensification of agriculture have led to increased pollution of water resources [2].

Water is one of the core essential and basic necessities. Fresh water today is a scarce resource, and it is being felt the world over. More than 2000 million people would live under conditions of high water stress by the year 2050. Whereas 1.8 billion people are predicted to live in regions with absolute water scarcity by 2025. This has happened due to unplanned management of water resources, insufficient planning, and insufficient political will. Water scarcity is, therefore, thought to be a serious problem throughout the world and mitigating this problem is one of the biggest challenges of the 21st century [3]

The population in India is to expected to stabilize around 1640 million by the year 2050, as a result, gross per capita water availability will declaim from 1820 m3 in 2001 to as low as ~1140m^3/ Year in 2050 thus the growing concern about water scarcity challenges us to think of alternative solutions to avoid the current problem of water scarcity [4].

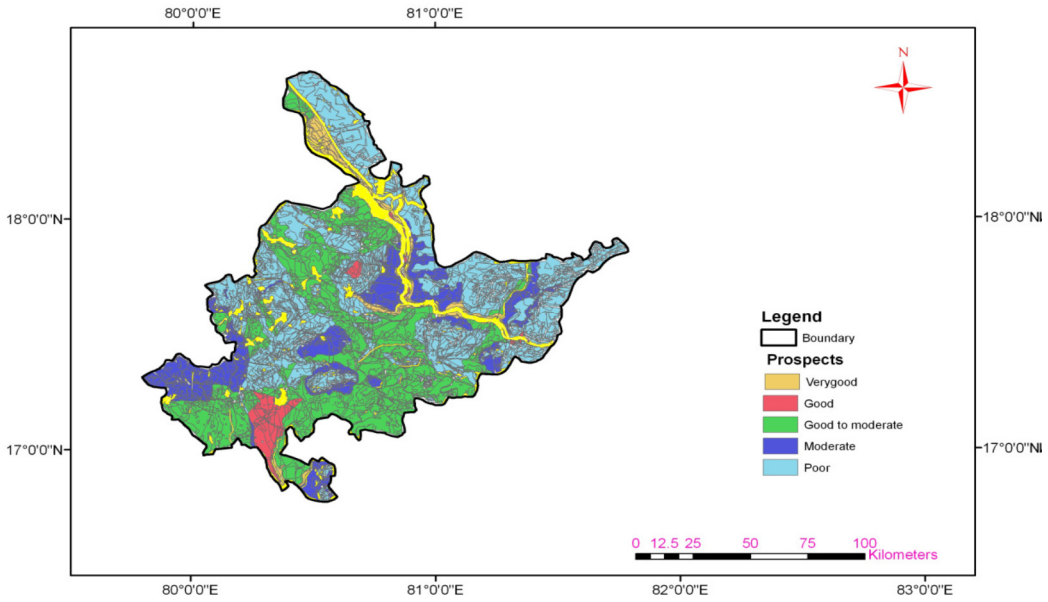
In India, More than 90% of rural population and nearly 30% of urban population depend up on ground water for meeting their drinking and domestic requirements. The distribution of ground water is not uniform in all the regions. The spatio- temporal variations in rain fall and regional or local differences in geology and geomorphology have led to an uneven distribution of ground water in different regions across in the country [5].

There are many challenges to improve access to drinking water and sanitation worldwide, and the two most important identified by the WHO are the rapid pace of urbanization and the large number of rural people that lack basic sanitation and safe drinking water.[6]

Ground water is most sensitive topic which has importance not only at local level, but also at global; level. The issue of ground water has become a problem of significance for the development of India. Unlimited exploration of ground water and extreme use of pesticides and fertilizers make probable the access of determine the ground water [7].

2. STUDY AREA

The Khammam segment of the South Indian carton is in the Krishna and Godavari river basins. Physiographic ally, the area falls under the uplands category and it shows a dendraitic drainage pattern with a general flow toward the two major river courses. The Munneru River is a major source recharge for ground water in the Khammam area. [8]. In Khammam District ground water prospects are observed as very good as 511.45 Km2, Good as 452.703 Km2, Good at moderate 55458.89 Km2, Moderate 2301.82 Km2, poor as 6171.39 Km2 in this Khammam Urban area containing of moderate levels shown in Table 1.



Source: Figure 1 Identification Ground water prospects of Khammam District,

Table 1 Ground water prospects of Khammam District

S. No	Ground water prospects Zones	Area in Km^2
1	Very good	511.45
2	Good	452.703
3	Good to Moderate	55458.89
4	**Moderate**	**2301.82**
5	Poor	6171.39

Source: Identification Ground water prospects of Khammam District.

3. MATERIALS & METHODS

3.1. Ground Water Sample Collection

sample of 2 liters of ground water is also collected, The samples (A-J) are collected in day time from different cites of urban area of Khammam (VDO's colony, Khasba bazaar, Cheruv bazaar, Rotary nagar, Mustafa nagar, Srinivas Nagar, SBIT, Nijampet , Khanapuram, Ballepalli) Table 3 and Fig1.In Physico –chemical analysis different parameters were anlysed like PH, Turbidity, Electrical Conductivity, TDS, Chloride, Sulphate, Nitrate, Total Alkalinity, Total Hardness, Calcium, Fluoride, Iron(see Table 2). pH performed on site by making use of water testing kit in the early hours For the analysis of water samples different Physico, Chemical methods are used for obtain quality, accuracy results in laboratory. The quality of ground water depends up on various chemical constituents and their concentration, which is derived from geological data of particular region [9].

Table 2 Water Parameters &Analysis Methods

S.NO	PARAMETER	Units	METHOD FOLLOWED
1	PH	-	Electrometric PH meter
2	Turbidity	NTU	Nephelometric Method
3	Electrical Conductivity	Micro mhos	Conductivity meter
4	TDS	Mg/l	EC X 0.456
5	Chloride	Mg/l	Argent metric Method
6	Sulphate	Mg/l	Turbid metric Method
7	Nitrate	Mg/l	Ultraviolet Spectrophoyometric Method
8	Total Alkalinity	Mg/l	Titration Method
9	Total Hardness	Mg/l	EDTA- Titration Method
10	Calcium	Mg/l	EDTA- Titration Method
11	Fluoride	Mg/l	Spectrophotometer
12	Iron	Mg/l	Phenanthroline Method

Table 3 Water Parameters &Analysis Results

S. No	Name of the Sample	Place	PH	Turbidity	EC	TDS	Chlorides	Sulphates	Nitrates	Alkalinity	Total hardness	Calcium	Fluoride	Iron
1	Sample A	VDO's colony	7.53	0.2	1728	1115	369	40.2	11.2	400	460	184	0.66	0.2
2	Sample B	Khasba bazar	7.38	0.2	1767	1140	363	42.3	11.5	344	448	180	0.19	0.38
3	Sample C	Cheruv bazar	7.37	6	2180	1406	423	70	11.8	548	560	200	0.38	0.28
4	Sample D	Rotary nagar	7.6	0.1	1112	717	119	44.4	10.6	224	300	144	0.22	0.23
5	Sample E	Mustafa nagar	7.95	3.5	1195	771	136	20.3	11.5	316	316	132	0.6	0.13
6	Sample F	Srinivas Nagar	7.48	1	1908	1231	397	36	11.9	408	492	192	0.71	0.29
7	Sample G	SBIT	7.54	2.8	1912	1233	389	46.1	7.1	440	480	188	0.25	0.51
8	Sample H	Nijampet	7.86	0	682	439	132	32.6	10.6	200	212	116	0.12	0.21
9	Sample I	Khanapuram	7.87	0.1	2310	1489	372	70	7.2	460	568	200	0.74	0.31
10	Sample J	Ballepalli	7.27	0	2480	1599	414	88	10.4	492	600	200	0.14	0.11

Table 4 Water Parameters ranges in study area and BIS, WHO Standards

S. No	Parameters	Range	BIS	WHO	MEAN
1	PH	7.95-7.38	6.5-8.5	6.5-8.5	7.57
2.	Turbidity	0-6	5-10 NTU	-	1.372
3.	Electrical Conductivity	682-2480	1500 mmhos	1500	1727.40
4.	TDS	439-1599	500 mg/l	500	1114
5.	Chloride	119-423	250 mg/l	250 mg/l	311
6.	Sulphate	20.3-88	200-400 mg/l	500mg/l	48.99
7.	Nitrate	7.1-11.9	45-100 mg/l	500 mg/l	10.38
8.	Total Alkalinity	200-548	200 mg/l	200	383.2
9.	Total Hardness	212-600	300-600mg/l	------	443.6
10.	Calcium	116-200	-	-----	173.60
11.	Fluoride	0.12-0.74	1-1.5mg/l	1.5 mg/l	0.401
12.	Iron	0.11-0.51	0.3-1.0 mg/l	------	0.265

Source: WHO, http://www.lenntech.com/applications/drinking/standards/who-s-drinking-water-standards.htm. [10], BIS, http://www.groundwatertnpwd.org.in/wqlab2.htm [11].

4. RESULTS AND DISCUSSION

In the present study ten study stations of total 12 parameters ware assessed and its comparison of variations individual parameters was showed in Fig 2-13.

4.1. PH

The PH is defined as the intensity of the acidic or basic character of solution at given temperature. It is a most important chemical factor of water, it is considered as important ecological factor of aquatic ecosystem [12]. In ground water analysis of different places of study area PH results are in the range of 7.95-7.38, these are within the limits of BIS and WHO standards.

4.2. Turbidity

Turbidity is an expression of light scattering and light absorbing property of water and is caused by the presence of suspended particles such as clay, silt and colloidal organic particles. Higher turbidity is known to affect the primary productivity by restricting the light penetration and photosynthesis [13]. In the present study turbidity range is 0-6 NTU.

4.3. Electrical Conductivity

The electrical conductivity of water depends up on ions present in water. It reflects the nutrient status of water and distribution of macrophytes [14]. In present study ground water analysis of different places of study area Electrical conductivity results are in the range of 682-2480 micro mhos, in this only Sample –H (Nizampet sample) is in 682 micro mhos, remaining samples are more than limits of BIS and WHO standards.

4.4. TDS (Total Dissolved Solids)

Total dissolved solids do not contain gases or the colloids, but consist of molecules and ions that are present as true solution in water. In natural waters, total dissolved solids are normally composed of salts of carbonates, bicarbonates, chlorides, sulphates and elements like silica, calcium, magnesium, sodium and potassium which confirm degree of hardness in water [15]. In present study ground water analysis of different places of study area Total dissolved Solids results are in the range of 439-599 mg/l , in this only Sample –H (Nizampet sample) is in 439 mg/l, it is in within the limits, remaining samples are more than limits of BIS and WHO standards.

4.5. Chloride

Chloride is one of the most important anion, which determines the total salinity of water. High chloride content in freshwater can be due to excessive evaporation and non-replenishment of the water loss through rainfall [16]. In present study ground water analysis of different places of study area chlorides results are in the range of 119-423mg/l , in this only Sample –D(Rotary nagar) , E(Mustafa nagar), H (Nizampet sample) samples are in limits , remaining samples are more than limits of BIS and WHO standards.

4.6. Sulphate

Sulphide oxidation in a carbonate environment produces ground water contamination with high sulphate making the water unsuitable for drinking supplies [17].In present study ground water analysis of different places of study area Sulphates results are in the range of 20.3-88 mg/l, in this all the samples are within the limits of BIS and WHO standards.

4.7. Nitrate

Higher concentration of nitrate is an indicator of organic pollution and eutrophication [18]. In present study ground water analysis of different places of study area Nitrates results are in the range of 7.1-11.9mg/l.

4.8. Total Alkalinity

Alkalinity in natural waters is formed due to dissolution of CO_2 in water or HCO_3 produced by the action of ground water on limestone or chalk. Alkalinity provides buffering to resist change in P^H [19]. In present study ground water analysis of different places of study area Total alkalinity results are in the range of 200-548 mg/l , in this only Sample –H (Nizampet sample) is in 200 mg/l, it is in within the limits, remaining samples are more than limits of BIS and WHO standards.

4.9. Total Hardness

The total hardness of water causing ions in water is mainly calcium and magnesium is the measure of the capacity of water to react with soap [20]. In present study ground water analysis of different places of study area Total hardness results are in the range of 200-600 mg/l, in this all the samples are within the limits of BIS and WHO standards.

4.10. Calcium

Calcium is exacerbated through leaching lime stone, Dolamite, Gypsum, and Gypsiferous state [21].The presence of calcium and magnesium along with their carbonates, sulphates and chlorides make the water hard. In present study ground water analysis of different places of study area Calcium results are in the range of 116-200 mg/l.

4.11. Fluoride

Traces of fluorides occur in many waters and higher concentration often associated with underground sources. Most of the waters contain below 1 mg/l. It effectively reduces dental caries without any adverse effect on health. Fluor sis may occur when fluoride level exceed the recommended limits [22]. In present study ground water analysis of different places of study area Calcium results are in the range of 0.12-0.74 mg/l. in this all the samples are within the limits of BIS and WHO standards.

4.12. Iron

Iron is the second most abundant metal in the earth's crust, of which it accounts for about 55 elemental Iron is rarely found in nature, as the iron FE^{2} AND Fe^{3}[23].The common source of Iron in ground water naturally occurring from weathering of iron bearing minerals and rocks, industrial effluent, acid mine drainage, Sewage. In present study ground water analysis of different places of study area Iron results are in the range of 0.11-0.51mg/l.

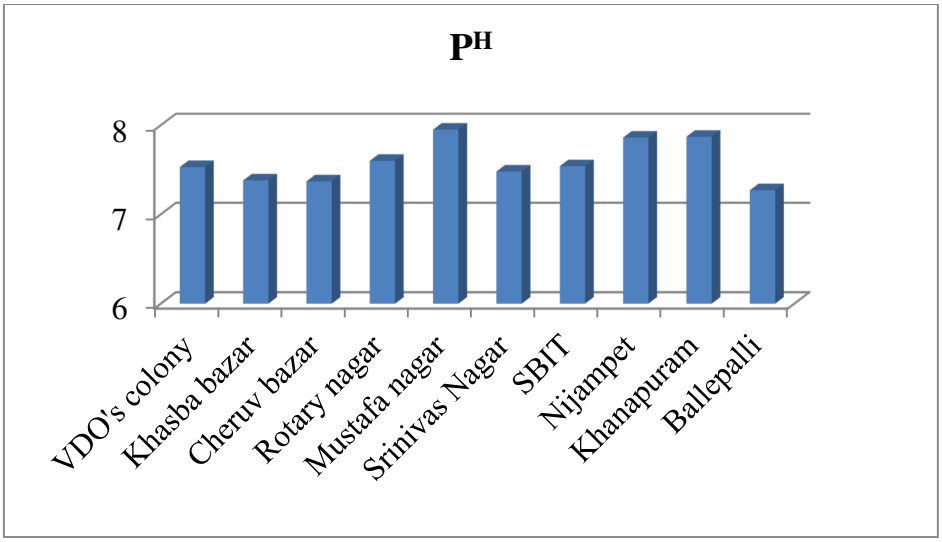


Figure 2 Comparison of variations of P^H in study area.

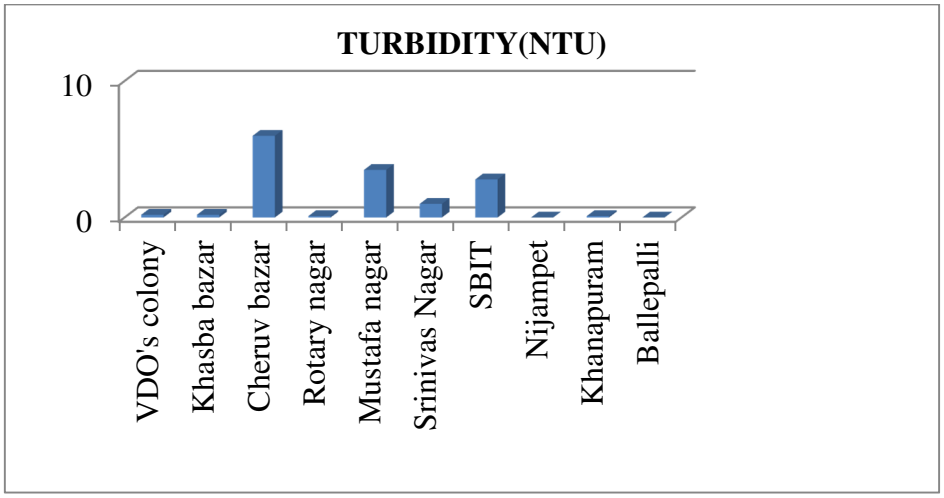


Figure 3 Comparison of variations of Turbidity (NTU) in study area.

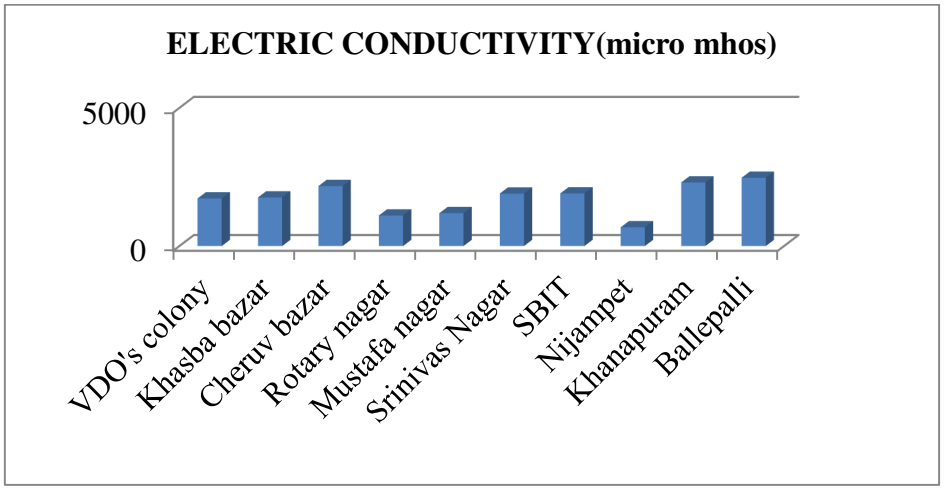


Figure 4 Comparison of variations of Electrical Conductivity (micro mhos) in study area.

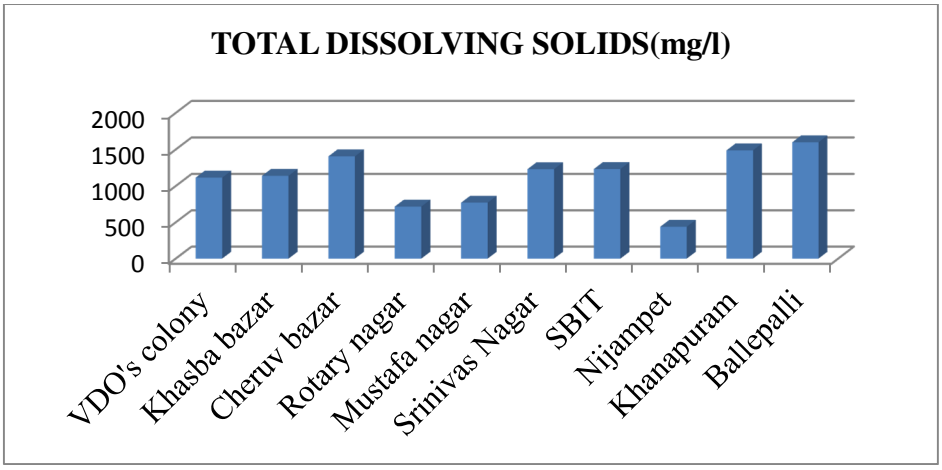


Figure 5 Comparison of variations of Total Dissolved Solids (mg/l) in study area.

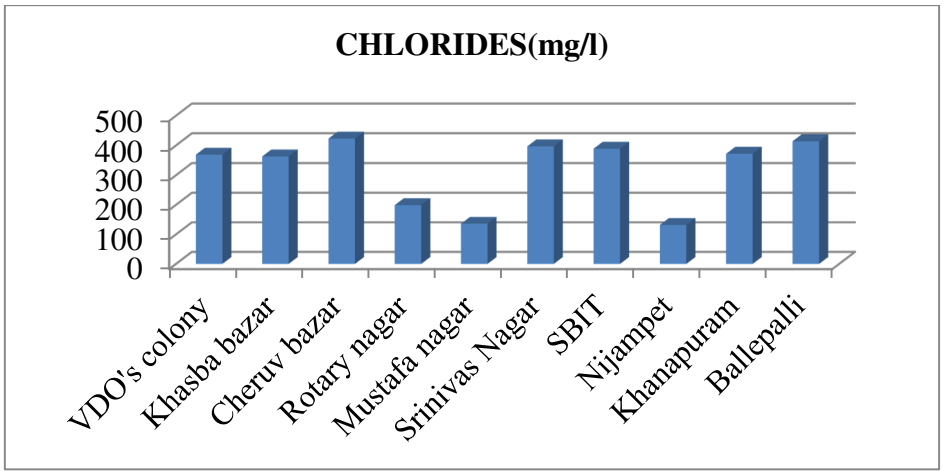


Figure 6 Comparison of variations of Chlorides (mg/l) in study area.

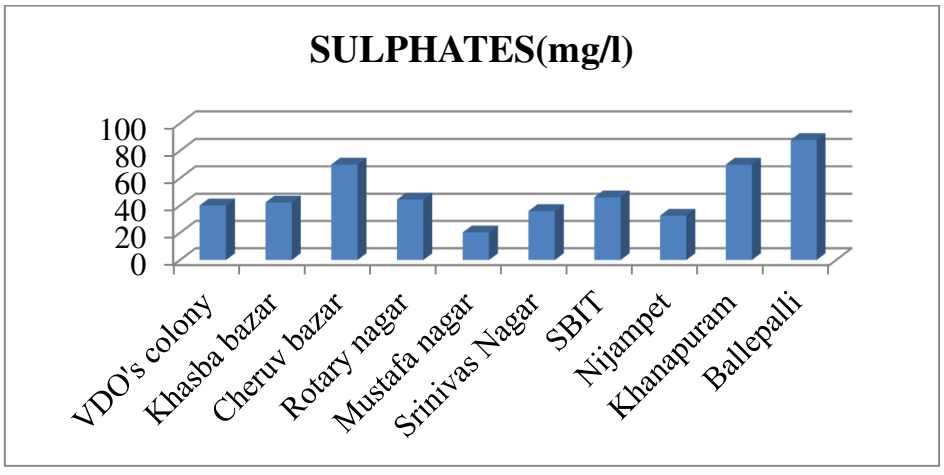


Figure 7 Comparison of variations of Sulphates (mg/l) in study area.

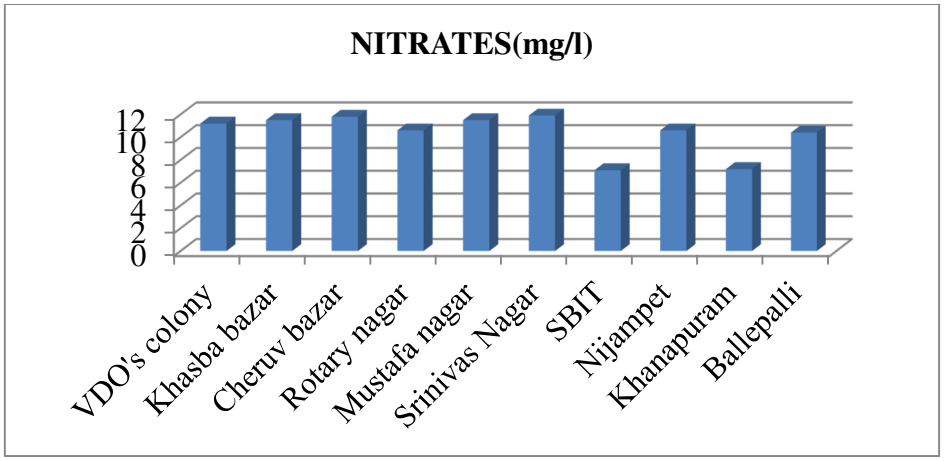


Figure 8 Comparison of variations of Nitrates (mg/l) in study area.

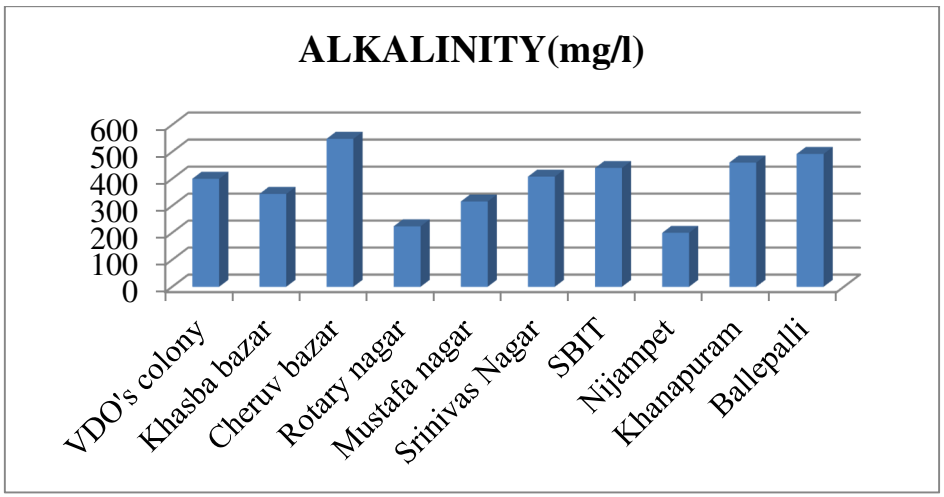


Figure 9 Comparison of variations of Alkalinity (mg/l) in study area.

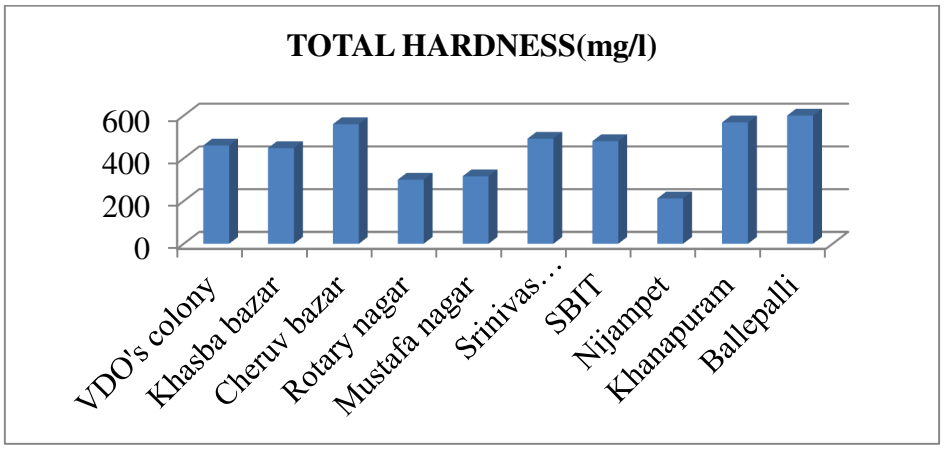


Figure 10 Comparison of variations of Total dissolved solids (mg/l) in study area.

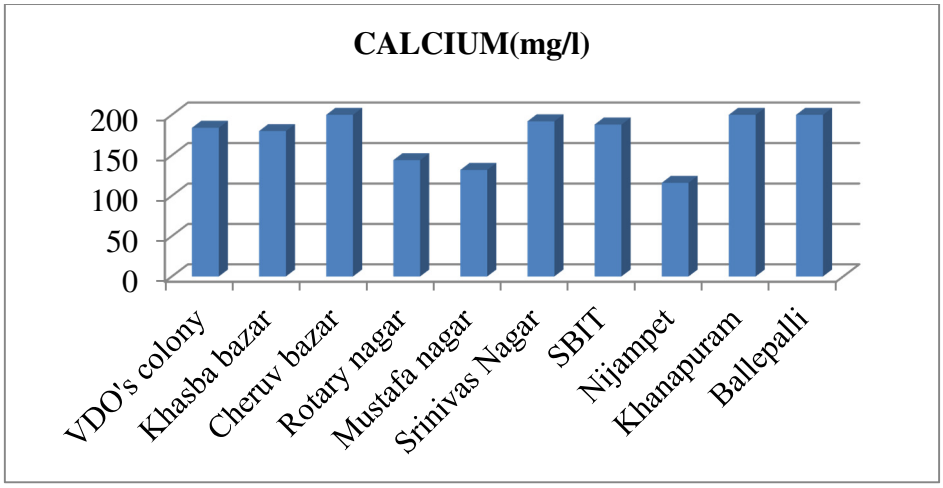


Figure 11 Comparison of variations of Calcium (mg/l) in study area.

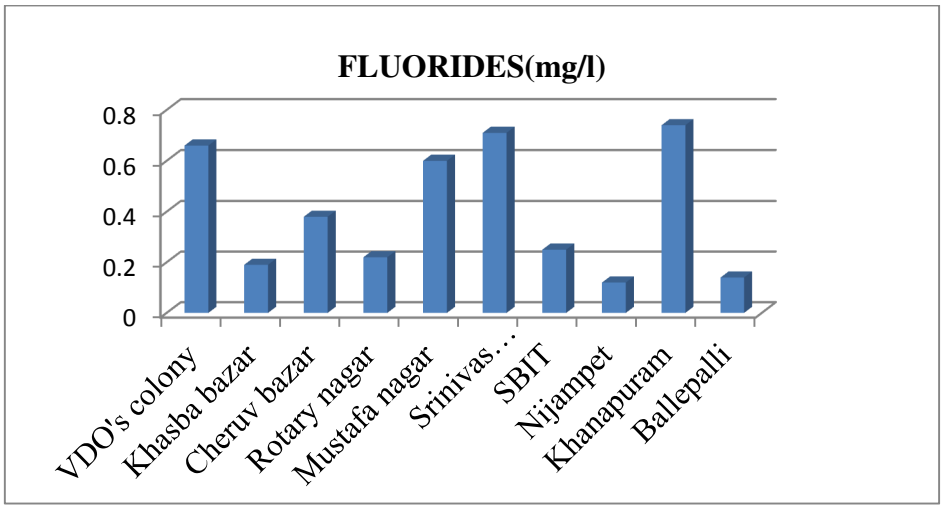


Figure 12 Comparison of variations of Fluorides (mg/l) in study area.

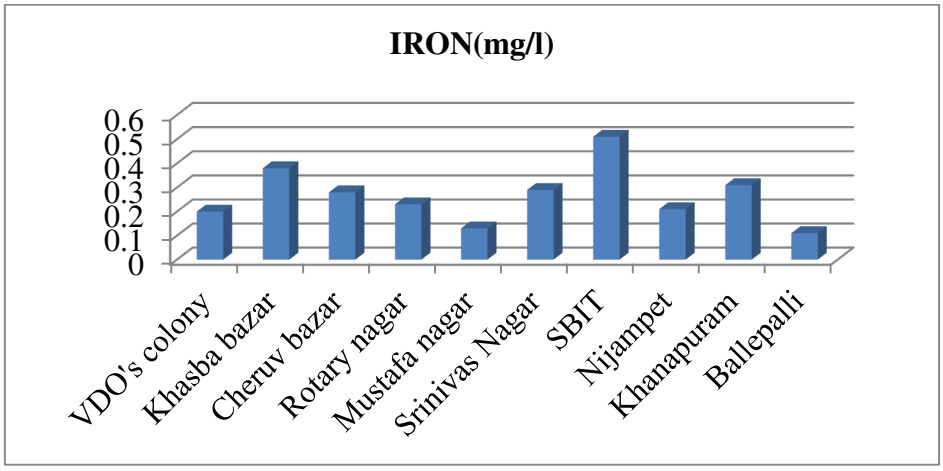


Figure 13 Comparison of variations of Iron (mg/l) in study area.

5. CONCLUSION

The present study shows detailed report of Physico- chemical characteristics assessment of ground water samples of urban region of Khammam. The study is analyzed 12 parameters of 10 different locations which are essential to identify ground water quality the water parameter results are compared with the standards of BIS, WHO. In overall ten stations sample –H (Nizampet) parameters are showed best results which are within the limitations of BIS, WHO standards.

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